

# GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Semester: 2

**Civil Engineering (Computer Aided Structural Analysis & Design)**

**Subject Name** Finite Element Method

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Sr. No	Course content
1.	Introduction: Principles of discretization, Element stiffness mass formulation based on direct, variational and weighted residual techniques.
2.	Finite element displacement approach: Shape functions & numerical integrations, convergence criteria, Computation of element properties using generalized co-ordinates & natural co-ordinates.
3.	Analysis of Structures – 2D and 3D truss elements, beam elements. Analysis of plane stress/strain and axisymmetric solids. Triangular, quadrilateral and isoparametric elements. Analysis of plate bending and shells.
4.	Analysis of Thermal and fluid flow Problems and application.
5.	Dynamic analysis: Free vibration analysis of truss bars with two D.O.F.- considering lumped mass and consistent mass formulations. Flexural vibration of beam elements
6.	Pre- processors for FEA modelling. FEA software packages and Applications.

## **Reference Books :**

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|---|---------------------------------------|
| 1. Finite Elements Procedures in Engineering analysis | - Bathe, Wilson                       |
| 2. Finite Element for Structural Analysis             | - Weaver & Johnston                   |
| 3. The Finite Element Methods                         | - Zienkiewicz                         |
| 4. Introduction to Finite Elements in Engineering     | - Chandrupatla, R.T. & Belegundu, A.D |
| 5. Finite Element Programming                         | - Hinton & Owen                       |
| 6. Finite Elements Methods                            | - C.S.Krishnamurthy                   |